



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|---------------------------|---------------------|------------------|
| 10/602,488 | 06/23/2003 | Tatyana N. Andryushchenko | 42P16161 | 1128 |

7590

06/08/2004

Todd M. Becker
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025-1026

| EXAMINER |
|----------|
|----------|

GURLEY, LYNNE ANN

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2812

DATE MAILED: 06/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/602,488

Applicant(s)

ANDRYUSHCHENKO ET AL.

Examiner

Lynne A. Gurley

Art Unit

2812

aw

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 23-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 and 34-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

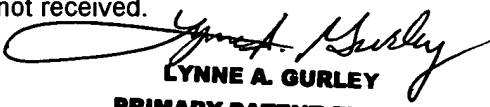
Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the amendment filed 3/22/04.

Currently, claims 1-44 are pending. Claims 23-33 are withdrawn without traverse.

Claims 1-22 and 34-44 are rejected.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 8-9, 11-13, 16, 19-20, 22, 34-35, 41-42 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Mayer et al. (US 2002/0074238, dated 6/20/02).

Mayer shows the method as claimed in Figures 1-4 and corresponding text, in a method of electropolishing a damascene structure by selective agitation, as: providing a wafer, the wafer comprising an interlayer-dielectric (ILD) 101 having a feature therein 103/105, an under-layer deposited on the ILD, a barrier layer deposited on the under-layer [0036] and a conductive layer deposited on the barrier layer [0037]; exposing the barrier layer (exposed by the electropolishing [0078] – [0079]); placing the wafer in an electrolyte, such that at least the barrier layer is immersed in the electrolyte [0078] – [0079]; and applying an electrical potential between the electrode and the wafer. The conductive layer is copper [0037]. The remaining metal layer may be removed by CMP [0079], but preferably is removed with the electropolishing process. There are additives [0042] – [0043], [0058] – [0061].

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 2812

6. Claims 3-7, 10, 14-15, 17-18, 21, 36-40 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer et al. (US 2002/0074238, dated 6/20/02) in view of Bao et al. (US 2003/0207558, dated 11/6/03, filed 5/6/02).

7. Mayer shows the method substantially as described in the preceding paragraphs.

8. Mayer lacks anticipation only in not teaching the barrier/adhesion layer materials; the pH, the electrolyte composition, and the electrical potential used.

Bao teaches the conventional refractory metal/refractory metal nitride adhesion/diffusion barrier layers [0006] – [0007].

It would have been obvious to one of ordinary skill in the art to have used the refractory metal/refractory metal nitride adhesion and barrier layers taught in Bao in the method of Mayer, with the motivation that these materials are conventional as described in Bao.

It would have been obvious to one of ordinary skill in the art to have used any of the variations of the claimed electrolyte composition, the electrical potential and the pH in the electropolishing method in Mayer, with the motivation that these parameters are chosen based on the metal to be removed and to the resulting layers from the polishing and the easy removal of these resulting layers. Mayer discloses that many additives may be used to vary the solution.

Response to Arguments

9. Applicant's arguments filed 3/22/04 have been fully considered but they are not persuasive. In response to Applicant's remarks, pages 8-10 of the amendment, Mayer shows the removal of the barrier layer by an electrolytic and a polishing means. The claims do not preclude both methods being used. See [0016] for disclosure of electrolyte-soluble diffusion barriers and

Art Unit: 2812

[0013] to [0015] and [0018] as well as [0021], and [0023]. Paragraphs [0036] to [0044] describe the removal of the barrier layer as well as the electrolytic solution and, the electrode immersed in the electrolyte. Part or all of the barrier layer is removed.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

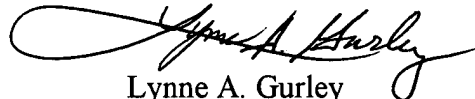
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

Art Unit: 2812

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Lynne A. Gurley
Primary Patent Examiner
TC 2800, AU 2812

LAG
June 4, 2004